ELY DISTRICT MANAGED NATURAL AND PRESCRIBED FIRE PLAN

United States Department of the Interior
Bureau of Land Management
Ely Field Office
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I. INTRODUCTION

A. Background

Fire is an integral and important naturally occurring ecological process within many of the Great Basin's vegetative communities. Wildland fire, started either by natural processes or by native peoples, has been a major element in the development of ecosystems in the western United States (Boyd 1999). Many of the vegetation communities were developed under a regime of intermittent fire, and are adapted in some way to fire. The historic (natural) fire regimes ranged from non-lethal surface fires to large lethal canopy fires.

There is evidence to support the existence of repeated wildland fires in eastern Nevada. It is not uncommon to find thin lines of charcoal exposed in arroyo cuts, marking episodes of prehistoric burning. Often more than one episode is visible in the exposure. In the pinyon-juniper woodlands ancient burned-out stumps can sometimes be found among mature stands of trees. Artifacts exhibiting crazing or pot lid scars, although not abundant, are occassionally encountered in archaeological sites.

As a result of recent changes in land use practices (i.e., livestock grazing, introduction of exotic plant species, and fire suppression) and human-caused climatic change (Tausch 1999), the severity of wildfire has increased. Livestock grazing reduces herbaceous plants which decreases ground cover and increases woody shrubs and trees that burn hotter and longer. Exotic species, such as cheatgrass, become established and replace native species. This results in an early stage of succession which can lead to a pattern of annual flash fires. Fire suppression prevents fire-dependent vegetation communities from burning in natural intervals. This results in large stands of closed-canopy shrubs and trees. When fires start, they burn larger areas with greater intensity which magnifies the effects of the fire.

Managed natural and prescribed fires can be an important tool to modify vegetation composition and age-class structure. Prior to 1995, fire management in the Ely District emphasized suppression of all wild fires, and prescribed fires were used infrequently. In 1995, the Federal Wildland Fire Management Policy and Program Review determined that wildland fire would be re-introduced into the ecosystem. The BLM Fire Management Strategies Working Group identified the process which Districts would use to evaluate the fire management program which would allow for the full range of fire management responses. The following criteria were identified in 1997:

A- Where is wildland fire not desired at all?
B - Where is unplanned wildland fire likely to cause negative effects, but these effects may be mitigated or avoided through fuels management, prescribed fire, or other strategies?
C - Where is fire desired to manage ecosystems, but there are constraints because of the existing vegetation condition due to fire exclusion?
D - Where is fire desired, and there are few constraints associated with resource condition, or social, economic, or political considerations?

In 1997 White Pine and Lincoln Counties established a Coordinated Resource Management (CRM) steering committee which formed a technical review team (TRT) to prepare a fire management plan which would allow fire to resume a more natural ecological role for all lands within the Ely District. This TRT included representatives from federal land management agencies, state and local government agencies, special interest groups, private citizens, and Native American tribes. The team divided the District into areas (polygons) based on the above criteria, fire history, past fire behavior, current vegetative conditions, other resource issues, and socio-political concerns. The Ely District Fire Management Plan was approved in August 1998. Beginning with the highest priority polygon, the TRT prepared a plan for that area. The result was the Final Environmental Assessment for Managed Wildland Fire within the Snake Mountain Range.

Continuing the process, the Ely District decided to write this plan for all other polygons where fire could assume a natural role. This Plan was prepared by an interdisciplinary team of resource specialists listed below.

Mark Barber	Riparian and Special Status Species
Lynn Bjorklund	Minerals
Shane DeForest	Noxious Weeds and Wild Horses
Mark Henderson	Archeology
Sue Howle	Environmental Coordination
Mike Main (Team Leader)	Fire Ecology
Gary Medlyn	Soil, Water, Air
Paul Podborny	Range and Wildlife
Curtis Tucker	Native American Consultation
Matt Wilkin	Geographic Information Systems (GIS)

B. Purpose of the Plan

The purpose of the Ely District Managed Natural and Prescribed Fire Plan is to identify management objectives, issues, constraints, management actions, and monitoring to enable the BLM to allow fire to function, as nearly as possible, as an ecological process within the Ely District. A section on plan review and revision is also included. The life of this plan is expected to be 20 years.

C. Description of the Plan Area

1. Land Status

The Ely District encompasses 11.7 million acres of public land in White Pine, Nye, and Lincoln Counties. This plan addresses fire management on approximately 3.4 million acres of these lands (Figure 1). Appropriate fire suppression will continue on the remaining 8.3 million acres of public land. The plan area is divided into fire management polygons based on containment size, or allowable burned acres to address resource issues/concerns. There are scattered parcels of private land found throughout the plan area ranging in size from less than 50 acres to over 1,000 acres.

2. Air Quality

There are no non-attainment areas within the Ely District as explained in the Clean Air Act, Section 176(c). Within and adjacent to the plan area are numerous sensitive receptors, such as communities (i.e., Caliente, Ely, Panaca, and Pioche), highway corridors (i.e., U.S. Highways 6, 50, and 93, and State Highway 318), and recreation areas.

3. Soils

Soils in the Ely District were mapped by the Natural Resource Conservation Service as part of eight different soil surveys. There are seven Order III surveys and one Order IV survey. Six of the surveys have been published, while the remaining two surveys have yet to be completed. Soils are quite variable, and are influenced by geology, topography, climate, and vegetation. Specific soil interpretations for things such as productivity and potential for re-vegetation following wildland fire are found by soil map units in the soil surveys. This information was considered in the development of the fire management polygons. Characterization of fire effects of soil types common to the fire management polygons, and additional site-specific soils information can be found in Appendix A.

4. Water Resources

There are numerous intermittent and perennial streams, springs and seeps throughout the plan area. Manmade impoundments, such as Eagle Valley Reservoir are also located within the plan area.

5. Vegetation

A detailed description of the most common vegetation communities within the identified fire management polygons is listed in Appendix B. Before intensive fire suppression began in the mid 1900's in eastern Nevada, wildland fires were common. Estimates place the interval between fires in sagebrush vegetation communities at 11 to 200 years, and for pinyon-juniper communities at 10 to 30 years for understory fires, and 100 to 300 years for severe crown fires. While these numbers are based on limited data, and are not specific to this area, it is presumed that fires occurred throughout the west and were common in the Ely District.

Figure 1. Ely District Managed Natural and Prescribed Fire Plan Area

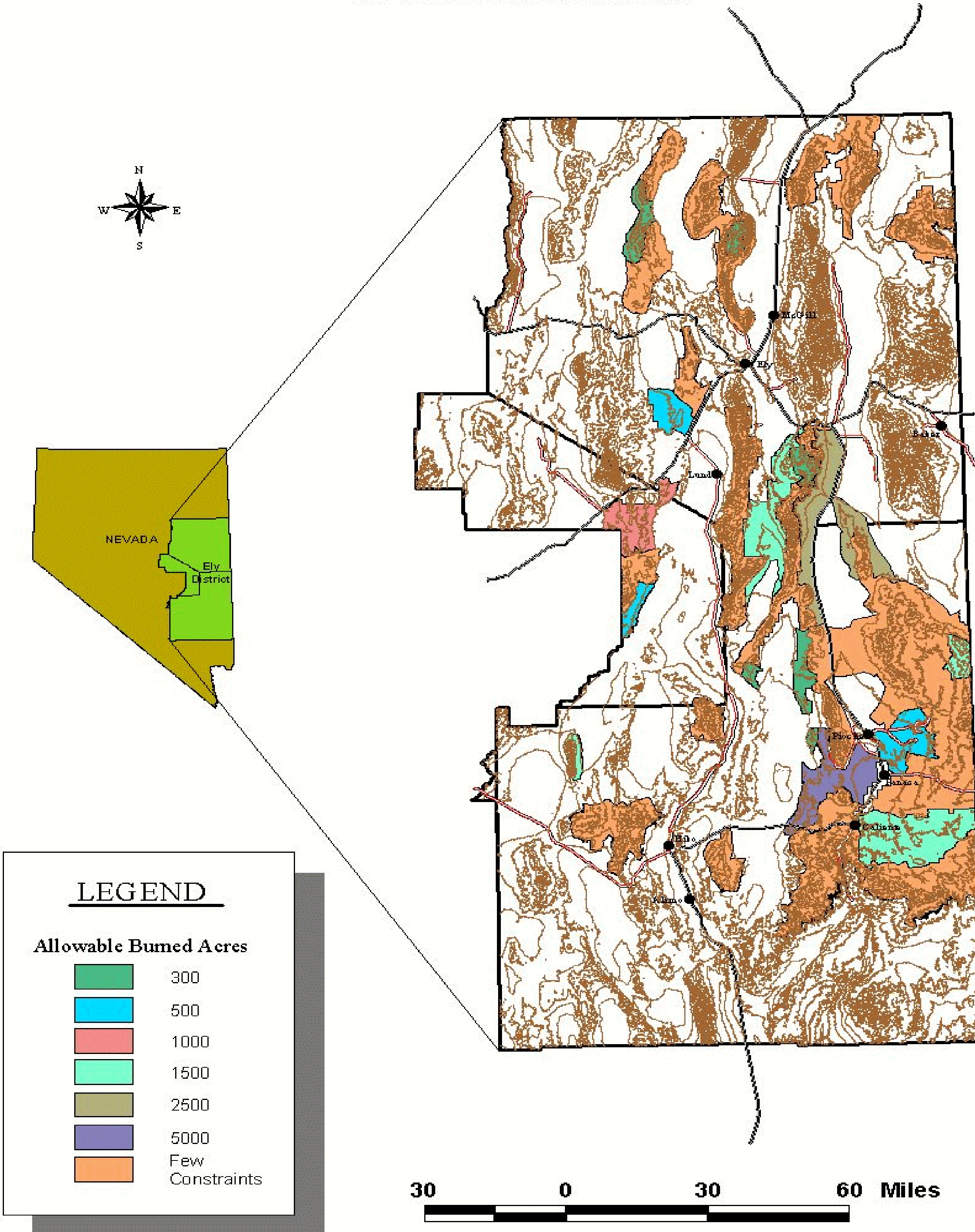


Table 1 lists the approximate number of acres and the normal fire return interval for each vegetation community in the plan area. The normal fire return interval refers to the average number of years between fires to maintain that vegetation community.

Table 1. Vegetation Communities within the Plan Area.

Vegetation Communities	**Approximate Acreage**	**Normal Fire Return Interval (years)**
Sagebrush	850,000	
A. Wyoming Big	(265,000)	25-100
B. Basin Big	(45,000)	30-70
C. Mountain Big	(180,000)	11-40
D. Black	(270,000)	100-200
E. Low	(90,000)	100-200
Pinyon-Juniper	2,500,000	10-30 (Understory Fires) 100-300 (Stand Replacing Fires)
Northern Mountain Brush	20,000	12-15
Southern Mountain Brush	10,000	15-25
Ponderosa Pine	2,500	20-50
Aspen	10,000	80-100
Curlleaf Mountain Mahogany	35,000	13-22
Mixed Conifer	30,000	
A. Limber Pine	intermixed	50-200
B. White Fir	intermixed	6-20
C. Subalpine Fir	intermixed	90-350
D. Englemann Spruce	intermixed	150+
E. Bristlecone Pine	intermixed	300+
Total	**3,392,500**	

6. Noxious Weeds

Less than 5 percent of the Ely District has been inventoried for noxious weeds. Seventeen species, such as Dalmation toadflax, spotted knapweed, bull thistle, Scotch thistle, leafy spurge, and black henbane have already been identified in the Ely District. As many as four other species occur just outside the District boundaries and could spread into the District.

7. Riparian Areas

There are 188 miles of stream riparian habitat in the Ely District. Only 61 miles (30 percent) are within the plan area. The major riparian areas within the plan area are Meadow Valley Wash, including Condor Canyon, and Clover Creek. Fires started by sparks from trains which run through the lower end of Meadow Valley Wash and Clover Creek are common. There are approximately 7,800 acres of riparian habitat associated with meadows, seeps, springs, and wetlands in the Ely District. Only a small percentage occurs within the plan area.

8. Threatened and Endangered Species

Appendix C lists special status species found within the plan area including federally designated threatened and endangered species, state-protected species, and Nevada BLM sensitive species. There are three birds, seven fish, one reptile, and one plant federally designated as threatened or endangered. Ten of these species are also state-protected species. The total number of species designated as Nevada BLM sensitive species in the Ely District include eleven mammals, thirteen birds, twelve fish, three reptiles, three amphibians, three snails, one true bug, three butterflies, and sixteen plants.

Four miles of Meadow Valley Wash flowing through Condor Canyon is designated Critical Habitat for the threatened Big Springs spinedace. There was a fire in Condor Canyon in July 1999 which burned a large portion of the riparian vegetation along the creek. A post-fire survey showed stable numbers of spinedace. The Meadow Valley speckled dace and the Meadow Valley desert sucker, Nevada BLM sensitive species, are found in Clover Creek. In addition, the Arizona toad is found within the Clover Creek drainage.

A recent inventory showed there are five miles of suitable nesting habitat and fourteen miles of potentially suitable nesting habitat for the endangered southwestern willow flycatcher along the section of Meadow Valley Wash downstream from Caliente. The ferruginous hawk, a state protected species, nests in pinyon-juniper stringers on bench areas within the Ely District. Of the estimated 500 nest sites found in the district, only about four percent are in the plan area.

Sage grouse, a Nevada BLM sensitive species, are found throughout the Ely District. There are approximately 200 strutting grounds, or leks, within the district, of which 9 occur in the plan area. In addition, the plan area includes nesting, brooding, summer and winter habitat for sage grouse. Generally, they prefer open sagebrush stands with an understory of perennial grasses and forbs. Dense stands of sagebrush are not used by sage grouse except during winters with deep snow.

9. Wildlife

Wildlife species common to the Great Basin are found throughout the plan area. Large mammals include elk, mule deer, bighorn sheep, pronghorn antelope, mountain lion, bobcat, and coyote. The sagebrush and mountain brush communities provide crucial summer and winter habitat especially for mule deer and pronghorn antelope. Other wildlife found within the plan area include desert cottontails, black-tailed jackrabbits, golden eagle, northern harrier, American kestrel, blue grouse, chukar, collared lizard, Great Basin rattlesnake, and other small rodents, passerine birds, reptiles, and amphibians.

10. Wild Horses

There is a total of 25 wild horse herd management areas (HMAs) within the Ely District. Eighteen HMAs are located within the plan area. The estimated wild horse population in these HMAs is 2,367 animals.

11. Livestock Grazing

There are 244 livestock grazing allotments within the Ely District. Portions of 139 of the allotments are included in the plan area.

12. Cultural Resources

The Ely District is rich in cultural resources. Less than 5% of the District has been inventoried, resulting in the recording of approximately 11,000 prehistoric and historic archaeological sites. Within the plan area there is representation of all types of archeological resources and historic properties. Although data has not been compiled specifically for this effort, certain types of sites are more likely to be found in the plan area. These sites include rock art, structures, toolstone quarries, rockshelters, spring water source related campsites and historic mine related sites, and are more often found in woodland vegetation communities on mountain slopes and benches. Other sites less likely to be found in the plan area include valley floor riparian related aboriginal campsites and late prehistoric and historic farming settlements. Appendix D details fire effects on cultural resources.

13. Native American Concerns

Native American tribes/bands which utilize resources within the plan area include the Duckwater, Shoshone, Ely Shoshone, Goshute, and Moapa. According to the Ely Shoshone Tribe, “Our traditional values respect plants, animals, soil, air, and water, and are sacred to us as native people.” The Ely and Duckwater Shoshone Tribes favor natural fires over other vegetation treatments.

14. Recreation

There are 36 developed and undeveloped recreation facilities and attractions found within the Ely District. A total of 11 of these exist within the plan area. Dispersed recreational activities, such as hiking, camping, hunting, and wildlife viewing, occur throughout the plan area year-round. Commercial recreational activities include OHV races, and guiding and outfitting.

15. Visual Resource Management

Visual resources are identified through a Visual Resource Management (VRM) inventory. This inventory consists of an evaluation of scenic quality, analysis of sensitivity level, and a delineation of distance zones. Based on these factors, the public lands in the Ely District were placed into four visual resource management classes. Wilderness Study Areas (WSAs) and designated scenic areas are considered Class I lands. While there are some Class II and III lands, the majority of the District has been designated as Class IV lands.

The following is a description of the different VRM classes:

> The Class I VRM objective is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
>
> The Class II VRM objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
>
> The Class III VRM objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the landscape.
>
> The Class IV VRM objective is to provide for management objectives which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. (USDI-BLM 1986).

16. Wilderness

There are portions of fifteen Wilderness Study Areas (WSAs) within the plan area (Table 2). These WSAs were identified through an inventory process in the late 1970's. Management within WSAs is guided by the Interim Management Policy for Lands Under Wilderness Review (BLM Manual Handbook-8550-1).

Table 2. Wilderness Study Areas (WSAs) within the Plan Area.

WSA Name and Number	Total Acreage of WSA	Approximate Acreage of WSA within plan area	Percentage of WSA within Plan Area
Blue Eagle WSA NV-060-158/199*	59,560	15,486	26
Clover Mountains WSA NV-050-139	84,935	50,112	59
Cougar Canyon WSA UT-040-123**	10,568	2,219	21
Far South Egans WSA NV-040-172	53,224	43,644	82
Fortification Range WSA NV-040-177	41,615	38,702	93
Mt. Grafton WSA NV-040-169	73,216	73,216	100
Parsnip Peak WSA NV-040-206	88,175	88,175	100
Riordan's Well WSA NV-040-166	57,002	34,201	60
South Egan Range WSA NV-040-168	96,916	75,594	78
South Pahroc WSA NV-050-132	28,600	27,170	95
Table Mountain WSA NV-040-197	35,958	35,958	100
Tunnel Spring WSA NV-050-166	5,400	5,400	100
Weepah Spring WSA NV-040-246	61,137	36,682	60
White Rock Range WSA NV-040-202	24,065	20,215	84
Worthington Mountains WSA NV-040-242	47,633	17,624	37
Total	**768,004**	**564,398**	

* WSA administered by the Battle Mountain Field Office.
** WSA administered by the St. George Field Office.

17. Mining

Mining notices, plans of operation, and mining claims are located throughout the Ely District, and many are within the plan area. Large plans of operation, such as for Placer Dome Bald Mountain Mine, Yankee Mine, Alligator Ridge Mine and others have good defensible space (cleared areas) around the mine protecting them from fires. Several small mining notices and periodic minerals exploration projects also occur within the plan area. These notices are recorded at the Ely Field Office, and their locations would be considered during the course of a managed natural or prescribed fire.

18. Forest Resources

Woodland products that are harvested for personal and commercial use include firewood, pine nuts, fenceposts, and Christmas trees. Pinyon and juniper are the more common trees harvested for firewood. Pinyon pine nuts are produced by young vigorous trees usually 60 to 100 years old.

Fenceposts are typically harvested from Utah juniper communities. Desirable posts range in size from 6 to 12 inches in diameter and from 8 to 12 feet long. Harvest sites are usually found on lower slopes and upper fan piedmonts within sagebrush communities and southern mountain brush communities. Quality posts are commonly found in old vegetation treatment areas where juniper is a common species.

Preferred Christmas tree harvesting areas typically occur where pinyon trees are invading adjacent sagebrush communities on upper fan piedmonts, along drainages, in old vegetation treatment areas, and in recovering burned areas. Nearly one third of the project area includes these types of sites. Christmas tree production in some of these areas has declined as the tree stands have become over-mature. Others areas are at the peak of their productivity.

19. Other

There are numerous rights-of-way for communication sites and power lines in the plan area.

II. MANAGEMENT GOALS AND OBJECTIVES

A. Management Goals

The short-term goal is to re-introduce fire using managed natural and prescribed fire. The long-term goal is to allow fire to resume its natural ecological role within the Ely District in designated areas. In addition, another long-term goal is to reduce fire suppression costs and acres requiring rehabilitation. Managed natural and prescribed fires should not require rehabilitation.

B. Management Objectives (Management objectives refer only to the areas within fire management polygons.)

1. <u>Fire Management Objectives</u>

Reduce fuel load on 300,000 acres out of the 850,000 acres of sagebrush communities by 2020.

Reduce fuel load on 875,000 acres out of the 2.5 million acres of pinyon-juniper communities by 2020.

Reduce fuel load on 1,250 acres out of the 2,500 acres of ponderosa pine communities by 2020.

2. <u>Vegetation Management Objectives</u>

In the following vegetative types, manage for the desired plant communities (Percent composition by weight) (USDA-NRCS 1995) by 2020:

a. Sagebrush - 40 to 65 percent grasses, 5 to 15 percent forbs, and 25 to 45 percent shrubs.

b. Pinyon-Juniper understory - 35 to 50 percent grasses, 10 to 20 percent forbs, and 35 to 50 percent shrubs.

c. Northern mountain brush - 30 to 45 percent grasses, 10 percent forbs, and 45 to 60 percent shrubs.

d. Southern mountain brush - 20 to 25 percent grasses, 10 percent forbs, and 65 to 70 percent shrubs.

e. Aspen understory - 20 to 40 percent grasses, 20 to 30 percent forbs, and 30 to 60 percent shrubs and young trees.

f. Curlleaf mountain mahogany understory - 15 to 45 percent grasses, 5 to 10 percent forbs, 10 to 20 percent shrubs, and 25 to 70 percent tree-like shrubs.

g. Ponderosa pine understory - 15 to 20 percent grasses, 10 percent forbs, and 70 to 75 percent shrubs and young trees.

h. Mixed conifer understory - 15 to 35 percent grasses, 15 percent forbs, and 50 to 70 percent shrubs and trees.

i. Maintain or decrease present level (acres infested) of noxious and invasive weeds.

3. Watershed Management Objectives

On burned areas, increase understory canopy cover of desirable species to 15 to 25 percent on 75 percent of the area within three normal growing seasons.

Increase water quantity by 10 percent at selected springs in plan area by 2020.

Maintain water quality to class B water standards as defined in Water Quality Regulations of the Nevada Division of Environmental Protection dated July 1999.

4. Human Resource Management Objectives

Protect all identified fire-sensitive archeological resources (i.e. rock art sites) and historic properties (i.e. standing structures).

Maintain current cultural values and resources.

Protect all developed and undeveloped recreation facilities and attractions.

Manage fires to conform with the visual resources management classes established within the land use plans.

Maintain or enhance wilderness values within WSA's consistent with the Interim Management Policy for Lands Under Wilderness Review.

III. ISSUES

The following issues were identified and considered in the development of this plan. Any impacts to these resources will be analyzed in environmental documents prepared in conjunction with this plan.

Air quality (i.e., smoke emissions)
Cultural resources
Livestock grazing
Mining (e.g., facilities, mine claim posts)
Native American concerns
Noxious weeds
Recreational opportunities
Threatened and endangered species
Vegetation
Visual resources
Water quality (i.e., surface)
Water quantity
Watershed
Wetland/riparian areas
Wild horses
Wilderness values
Wildlife habitat
Woodland products (e.g., Christmas trees, pine nuts, firewood)

IV. CONSTRAINTS

Management actions developed in this plan will comply with the following laws, regulations, policies, procedures, and approved plans:

- National Historic Preservation Act of 1966 (as amended)
- Wild and Free Roaming Horse and Burro Act of 1971 (as amended)
- The Endangered Species Act of 1973 (as amended)
- The American Indian Religious Freedom Act of 1976
- The Archaeological Resources Protection Act of 1979 (as amended)
- The Native American Grave Protection and Repatriation Act of 1989
- Interim Management Policy and Guidelines for Lands under Wilderness Review
- Visual Resource Management Classifications
- Guidelines for Management of Sage Grouse Populations and Habitats (Draft)
- Schell Resource Area Management Framework Plan
- Caliente Resource Area Management Framework Plan
- Egan Resource Area Resource Management Plan
- State Air Quality Standards
- State Water Quality Regulations
- Final Wilderness Management Plan Mt. Moriah Wilderness
- Various Activity Plans
- Fire National Preparedness Level

V. MANAGEMENT ACTIONS

A. Fire Management Polygons

The plan area is broken into thirty-four (34) fire management polygons based on natural features, cultural characteristics, and resource concerns. Depending on the specific issues within each polygon, there are specified limits for allowable burned acres (300 acres, 500 acres, 1,000 acres, 1,500 acres, 2,500 acres, 5,000 acres, and few constraints (5,000+ acres)) (Table 3). These acreage limits are established as guidelines. It is expected that 75 percent of the time individual managed natural fires will not exceed these limits.

In addition to the allowable burned acres there are site-specific concerns within each polygon. These include wilderness study areas (WSAs), intermingled private lands, rock art sites, range improvements, mine sites, historic structures, and special status species. These site-specific concerns will be identified on detailed maps for each fire management polygon and available for review when a fire occurs. The maps will be updated as new resource data becomes available.

1. <u>Fire Management Polygons Limited to 300 Acres</u>

Fires within these polygons are limited to no more than 300 acres per incident because of mule deer summer and winter range. Burning more acres within a given area could reduce the forage available for deer herds. These areas include West Side Butte Mountains, Telegraph Peak, Horse Camp Wash, Burnt Peak, West Range, and Ely Spring Range.

2. <u>Fire Management Polygons Limited to 500 Acres</u>

Fires within these polygons are limited to 500 acres because of mule deer winter range, pronghorn antelope winter range, sage grouse habitat, and land ownership. Burning more acres within a given area could reduce forage and habitat for the deer and antelope herds and sage grouse populations. These areas include Jakes Wash, Scofield Bench, and Meadow Valley Wash. In addition, fires need to be contained to 500 acres or less because of land ownership patterns within the Meadow Valley Wash polygon. This limitation will reduce the chance of burning private lands.

3. <u>Fire Management Polygons Limited to 1,000 Acres</u>

The Horse Range is limited to 1,000 acres because of mule deer winter range. The allowable burned acres is greater than other polygons with mule deer winter range because of the larger size of this polygon.

4. <u>Fire Management Polygons Limited to 1,500 Acres</u>

Fire within the Cave Valley polygon is limited to 1,500 acres because of sage grouse habitat. Fire within the White Rock Mountain polygon is limited to this acreage because of mule deer summer range. Fire within the Clover Creek Watershed polygon is limited to 1,500 acres

Table 3. Fire Management Polygon Information.

Fire Management Polygons	Size (acres)	Allowable Burned Acres	Rationale
North Butte Mountains	45,623	few constraints	
West Side Butte Mountains	43,826	300	Deer Winter Range
South Butte Mountains	78,944	few constraints	
Telegraph Peak	17,824	300	Deer Summer Range
Cherry Creek/ Egan Range	156,762	few constraints	
Antelope/North Schell Creek Range	178,824	few constraints	
Kern Mtns	100,007	few constraints	
Kimberly Peak	47,326	few constraints	
Jakes Wash	48,368	500	Pronghorn Habitat and Sage Grouse Habitat
Horse Range	79,808	1,000	Deer Winter Range
Grant Range	48,322	few constraints	
Scofield Bench	23,235	500	Deer Summer Range
South Egan Range	171,595	few constraints	
Cave Valley	129,690	1,500	Sage Grouse Habitat
Majors	18,337	few constraints	
Horse Camp Wash	26,261	300	Deer Summer Range
South Schell Highland	120,183	few constraints	
South Schell Bench	111,389	2,500	Sage Grouse Habitat
Fortification Benches	64,827	2,500	Deer Winter Range
Mt Wilson	762,527	few constraints	
White Rock Mountains	28,386	1,500	Deer Summer Range
Bristol/ Fairview Ranges	93,557	few constraints	
West Range	38,784	300	Deer Winter Range
Burnt Peak	10,382	300	Deer Winter Range
Ely Spring Range	6,816	300	Deer Winter Range
Black Canyon	126,231	5,000	
Meadow Valley Wash	81,023	500	Deer Winter Range and Land Ownership
Clover Creek Watershed	174,563	1,500	Watershed Management
Clover Mountains	172,941	few constraints	
Delamar Mountains	211,085	few constraints	
South Pahroc Range	51,914	few constraints	
Timber Mountain	37,580	few constraints	
Worthington Mountains	21,329	1,500	Topography
Mt Irish	124,092	few constraints	

because of watershed management concerns. The Worthington Mountains polygon is a long, narrow topographic feature. Fire will be limited to 1,500 acres to prevent burning the entire polygon in one event.

5. Fire Management Polygons Limited to 2,500 Acres

Fire within the South Schell Bench and Fortification Bench polygons is limited to 2,500 acres to protect mule deer winter range and sage grouse habitat.

6. Fire Management Polygons Limited to 5,000 Acres

Fire within the Black Canyon polygon is limited to 5,000 acres to protect mule deer winter range.

7. Fire Management Polygons with Few Constraints (5,000 + acres)

The remaining fire management polygons have few constraints because there are no over-riding resource concerns.

B. Managed Natural Fire

1. Resource Protection Measures

Vegetation may be removed to protect fire-sensitive resources and improvements located within fire management polygons. This work would be done over the life of this plan on a priority basis.

Standard operating procedures for managed natural fires are listed in Appendix E.

2. Decision-Making Process

Following a fire report, the fire management staff will make a determination of the fire location. If the reported fire is within the plan area, they will evaluate the fire's potential based on current fire behavior, intensity, and expected growth. They will also consider national preparedness level, current district fire activity, local resource availability, and forecast weather trends. The focus of this evaluation will be to determine if the allowable burned acres objective is achievable. If the objective is achievable, fire managers will convene a managed fire implementation team (MFIT). This interdisciplinary team will consist of BLM resource specialists and may include representatives from other agencies such as Forest Service, Nevada Division of Wildlife, and Nevada Division of Forestry. In addition, local government officials and affected interests may be consulted. The MFIT would review files and detailed maps and prepare a Wildland Fire Implementation Plan (WFIP) (Appendix F). The fire would be monitored from the ground or by air while it is burning. Fire behavior and fire weather data will be collected. The MFIT would meet as needed to evaluate the fire. If the allowable burned acres objective cannot be met, appropriate fire suppression actions will be initiated.

At the conclusion of each managed natural fire, the MFIT will determine if the allowable burned acres for that particular fire management polygon should be revised as a result of the fire. If there are any negative impacts, rehabilitation measures may be recommended.

C. Prescribed Fire

1. Resource Protection Measures

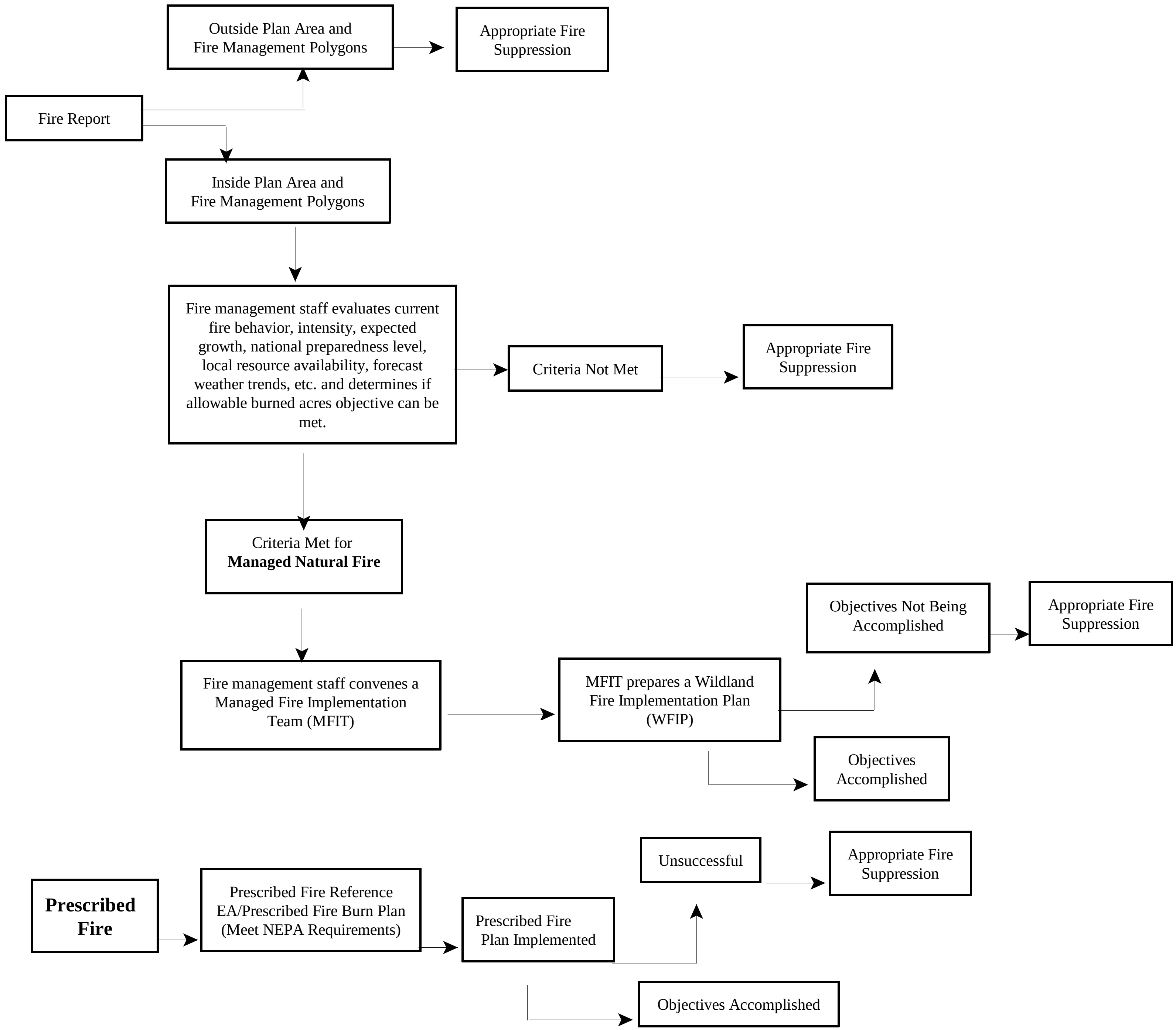
Standard operating procedures for prescribed fires are also listed in Appendix E.

2. Decision-Making Process

Prescribed fire is one of many recognized tools that have been identified in various activity plans to meet management objectives. Before a prescribed fire is used, BLM resource specialists will scope the proposal with affected and interested parties. A reference environmental assessment will then be prepared to analyze site-specific impacts. After the decision record/finding of no significant impact (DR/FONSI) is signed by the authorized officer, the fire management staff will prepare a prescribed burn plan for the site (Appendix G). Upon completion, an Open Burn Variance (i.e., smoke permit) will be obtained from the Nevada Division of Environmental Protection, Bureau of Air Quality prior to a prescribed fire. At the conclusion of the project, a post-burn evaluation would occur and monitoring studies would be established.

Figure 2 illustrates the steps which will be followed when a fire is reported to determine if managed natural fire will be implemented.

Figure 2. Managed Natural and Prescribed Fire Process.



VI. SUGGESTED MONITORING

Fire behavior monitoring will occur during the fire event to determine if prescriptions are being met. Post-fire monitoring will also be conducted to determine if the management objectives of this Managed Natural and Prescribed Fire Plan are being met.

A. Fire Management

Fire management data (i.e., acres, fuel type, fuel consumption, emissions, costs) for each managed natural and prescribed fire would be reported in a Department of the Interior Individual Fire Report (DI-1202). The total acres burned within each vegetation community would be documented.

B. Vegetation Management

After each managed natural fire, site-specific monitoring studies may be established within the burned area and adjacent unburned areas to determine vegetation response. These studies could include photo points, frequency, cover, and production transects (USDI-BLM 1996), and would be identified in the WFIP.

For prescribed fires, site-specific monitoring studies may be established prior to burning to document pre-burn vegetative conditions. After the fires, these studies would be re-read to evaluate post-fire effects. These studies would be identified in the prescribed burn plan.

C. Watershed Management

Water flows at selected springs would be measured 2 to 5 years after a fire, and compared with information in the District water resource inventory to determine any increase in flow. Water samples may be collected at selected sources. Those parameters that may be affected by fire will be analyzed, and compared to existing baseline information.

D. Human Resource Management

Any public contacts pertaining to a fire will be documented. A post-fire inspection may be conducted to determine any impacts to visitor or commercial uses of the burned area. These impacts would be documented with photographs, and included in the final report.

Known fire-sensitive archeological resources and historic properties may be monitored while a fire is burning. After the fire, these sites may be visited. Any impacts to the sites would be documented using diaries, journals and photographs, and incorporated in cultural resources inventory forms.   A reconnaissance for non-sensitive sites may be conducted after the fire, and any impacts would be documented in inventory forms.

The fire may be monitored while it is burning to evaluate the effects of the fire on wilderness values or characteristics according to the Interim Management Policy for Lands Under Wilderness Review, and on visual resources. After the fire, monitoring may be conducted to determine whether wilderness values were maintained or enhanced. Results would be documented with photographs and filed in wilderness study area notebooks. Burned areas may also be evaluated using the VRM Contrast Rating worksheets.

VII. IMPLEMENTATION

It is difficult to estimate how many of the fires reported each year will meet the conditions for a managed natural fire. The costs associated with managed natural fires will be covered at the end of the year as outlined by current policy and procedures. Because a prescribed fire is planned in advance, the projected costs of the fire would be included in the BLM's planning target allocation for the year the prescribed fire is scheduled.

VIII. PLAN REVIEW AND REVISION

On an annual basis, an interagency/interdisciplinary team will review all managed natural and prescribed fires which occurred during the year. Monitoring data will be analyzed, and any changes to the fire management polygons would be made at this time.

The Managed Natural and Prescribed Fire Plan will be evaluated every five years, and revised if necessary.

IX. GLOSSARY

Composition The proportions (percentages) of various plant species in relation to the total on a given area. It may be expressed in terms of cover, density, or weight.

Desired Plant Community The kind, amount, and proportion of vegetation which best meets land use objectives for a particular site, and which must be within the site's capability to produce through management or a combination of management and land treatment.

Fire Behavior The manner in which a fire reacts to fuel, weather and topography; common terms used to describe fire behavior include smoldering, creeping, running, spotting, torching and crowning.

Fire Dependent Plants, plant communities, or animals that rely on fire as one mechanism to create the optimal situation for their survival.

Fire History The chronological record of the occurrence of fire in an ecosystem.

Fire Management Plan A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire Prescription A document written by natural resource managers to indicate when or if a fire will be ignited by trained professionals.

Fire Regime The role fire plays in a ecosystem; a function of the frequency of fire occurrence, fire intensity and the amount of fuel consumed.

Fuel All the dead and living material that will burn. This includes grasses, dead branches and pine needles on the ground, as well as standing live and dead trees. Also included are minerals near the surface, such as coal that will burn during a fire, and human-built structures.

Fuel Break A wide strip with a low amount of fuel, usually grass, in a brush or wooded area to provide soil cover and serve as a line of fire defense.

Fuel Load The amount of combustible material (living and dead plants and trees) that is found in an area usually defined in tons per acre.

Long-term Ten to twenty years.

Managed Natural Fire Allowing naturally ignited fires, such as those started by lightning, to burn under specific management prescriptions with limited fire suppression.

Prescribed Fire Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Short-term Five years or less.

Succession The gradual replacement of one plant and animal community by another, as in the change from an open field to a mature forest.

Surface Fire A fire that burns leaf litter, fallen branches and other fuels located on the forest floor.

Vegetation Community A kind of existing plant community with distinguishable characteristics described in terms of the present vegetation that dominates the aspect or physiognomy of the area.

Wildfire Any fire occurring on wildlands that is not meeting management objectives, and requires a suppression response.

Wildland Fire All fires that burn in wildlands, including wildfires and prescribed fires.

APPENDIX A

Soils and the Effects of Fire

Soils on alluvial fans and piedmont slopes are quite variable. The soils on the tops of these fans tend to be older, and have a silica or lime-cemented hardpan. They may also have clay subsoils. The hardpan limits the amount of available moisture, and restricts root penetration. The most common vegetation on these soils is sagebrush and perennial grasses. Pinyon and juniper encroachment is common, and affects site productivity. Wind erosion is slight and water erosion is slight to moderate when the vegetation is removed by fire.

Soils on mountains and hills may be shallow to deep over bedrock. Soil texture is variable, and may or may have rock fragments in it. These mountain soils support pinyon-juniper, aspen, mixed conifer, curlleaf mountain mahogany, and mountain brush communities. Wind erosion is slight. Water erosion can be moderate to severe depending on soil texture, slope, and the amount of rock fragments in the soil.

Cryptogamic crusts, also referred to as microbiotic crusts, are commonly found on the soils in the Ely District. These crusts are composed of various living organisms and their by products. In the Great Basin, *Microcoleus vaginatus*, a blue-green algae, comprises the vast majority of the crust. Lichens of the *Colleria spp*. and moss of the genera *Totula* are also common (Johnson 1997). Cryptogamic crusts serve many functions including nitrogen fixation, soil stability, and improved plant health for certain plant species. They may also increase or decrease infiltration. Fire can cause a decline in cryptogamic crusts. Low intensity fires would not remove all the crust structure. This impact would be severe in high intensity fires. Blue-green algae recovers rapidly after a fire, reaching undisturbed densities within one to five years. This is because the higher pH in the soil after a fire favors the establishment of the algae. Algal cells of many species can survive the most severe disturbances (Debano et al. 1998). Typically bacterial populations reduced by fire increase dramatically after the first rainfall (Clark1994). There is limited research on lichens which form parts of the cryptogamic crust. It was found that black lichen was the first plant to repopulate an area burned by fire in a southern Utah desert shrub community. This was done through seed dispersal from unburned areas within and adjacent to the burned area. The recovery time for cryptogamic crusts can be improved by limiting the size and intensity of a fire. Increasing the mosaic pattern of the fire so there is a nearby source of inoculum will also speed up the recovery.

The amount of duff consumed by fire is highly dependent on the moisture content of the duff. Duff with a moisture content of 120 percent or greater will not burn. Between 30 and 120 percent, the amount of duff consumed depends on the consumption rate of the associated surface fuels. Duff with a moisture content of less than 30 percent will burn on its own (Peterson 1999).

Approximately eight percent of the heat generated by a fire is transferred to the mineral soil. The amount of heat transfer relates directly to the duration of all phases of combustion. The temperatures reached by the soils are also dependent on the amount of duff and organic matter insulating the soil. Finally, the size of surface fuels that contact the soil, and the length of time these fuels burn affects the heating of the soils (Peterson 1999). In grasslands the soil is usually heated to a maximum 125°C in fifteen minutes. In brush communities the soil reaches a maximum temperature of 200°C in thirty minutes. In woodlands with heavy duff, the soil can be heated to 400°C and is reached after sixteen hours of smoldering. Most of this heating occurs within the top two centimeters of the soil.

As a result of heating the soil, chemical and physical changes occur in soil nutrients and in the organic matter in the soil. At 150°C rapid pyrolysis occurs. Between 300 and 390°C, soil pH increases, and up to 75 percent of the nitrogen in the soil is lost. Heating the soil for a long time at temperatures between 400 and 500°C causes ashing of organic matter. At higher temperatures, structural changes in the soil occur (Hartford and Frandsen 1992).

Hydrophobicity is the result of the distillation of organic compounds that causes soils to develop resistance to wetting. Although hydrophobicity occurs naturally in the absence of fire, the effects are compounded after a fire. This can result in increased runoff. The danger of hydrophobicity is greatest after fires in chaparral communities and forested areas. It may also occur in sagebrush communities where the shrubs and basal litter are consumed by a slow burning fire. Hydrophobicity occurs primarily in coarse textured granitic soils following fires that heat the soil to between 176 and 204°C. Granitic soils are very limited within the Ely District occurring mainly in the Kern Mountains. Fine textured soils with a moderate amount of soil moisture are not susceptible to this phenomenon when the soil temperature remains below 176°C. When the soil is heated above 288° C, these hydrophobic compounds are destroyed, and hydrophobicity is not a concern (Clark 1994).

APPENDIX B

Vegetation Communities

Sagebrush Communities: The sagebrush/perennial grassland community in the area covers approximately 900,000 acres. This community occurs in alluvial fans; from fan piedmont slopes to ridgetops on all exposures. Slopes range from 2 to 75 percent, of which 4 to 25 percent slopes are the most typical. Elevations range from approximately 5,000 to 12,000 feet The accepted ranges of fire occurrence within the sagebrush vegetation types (Miller 1998) are as follows:

> Wyoming big sagebrush (Artemisia tridentata var. wyomingensis) - estimated fire return intervals of 25 to 100 years. The frequency was closer to 100 years where shrubs were small in stature and grass sparse due to low site productivity and precipitation,. This sagebrush community occupies approximately 35 percent (315,000 acres) of the sagebrush dominated areas.
>
> Basin big sagebrush (Artemisia tridentata var. tridentata) - estimated fire return intervals of 30 to 70 years during the pre-settlement period with dry sites burning at greater than 50 year intervals. This sagebrush community occupies approximately 5 percent (45,000 acres) of the sagebrush dominated areas.
>
> Mountain big sagebrush (Artemisia tridentata var. vaseyana) - estimated fire return intervals of 11 to 40 years during pre-settlement period. This sagebrush community occupies approximately 20 percent (180,000 acres) of the sagebrush dominated areas.
>
> Black sagebrush (Artemisia arbuscula var. nova) - estimated fire return intervals of 100 to 200 years. This sagebrush community occurs on approximately 30 percent (270,000 acres) of the sagebrush dominated areas.
>
> Low sagebrush (Artemisia arbuscula) - estimated fire return intervals would be similar to black sagebrush of 100 to 200 years. This sagebrush community occupies approximately 10 percent (90,000 acres) of the sagebrush dominated areas.

Various perennial grass species are associated with the big sagebrush communities. Among the most important are: bluebunch wheatgrass (Pseudorogneria spicata), Thurber needlegrass (Stipa thurberiana), Indian ricegrass (Oryzopsis hymenoides), bottlebrush squirreltail (Elymus elymoides), needle and thread (Stipa comata), basin wildrye (Elymus cinereus), Sandberg bluegrass (Poa secunda), muttongrass (Poa fendleriana), Nevada bluegrass (Poa nevadensis), and Canby bluegrass (Poa canbyi). Important forb species include; arrowleaf balsamroot (Balsamorhiza sagittata), desert globemallow (Sphaeralcea ambigua) silky lupine (Lupinus sericeus) and taper hawksbeard (Crepis acuminata). Potential vegetative composition ranges from about 50 to 65 percent grasses, 5 to 15 percent forbs, and 25 to 45 percent shrubs.

Site productivity affects the burning patterns of the big sagebrush species. Highly productive sites have greater plant density and more biomass, which enables the fuels to carry the fire. Among the three subspecies of big sagebrush, mountain big is the most flammable, Wyoming big is the least flammable and basin big is of intermediate flammability. All three species are easily killed by fire but re-establish themselves through seed caches and off-site seed.

The black sagebrush communities range from low arid foothills to high mountain ridges. The perennial grasses associated with these communities are Indian ricegrass, bluebunch wheatgrass, Thurber needlegrass, bottlebrush squirreltail, needle and thread, muttongrass, Canby bluegrass and Sandberg bluegrass. Potential vegetative composition ranges from about 40 to 60 percent grasses, 5 to 15 percent forbs, and 45 to 55 percent shrubs.

The low sagebrush communities range from upper fan piedmonts to high mountain ridges. The perennial grasses associated with these communities are bluebunch wheatgrass, Thurber needlegrass, muttongrass and pine needlegrass (Stipa pinetorum). Potential vegetative composition ranges from about 40 to 65 percent grasses, 10 to 15 percent forbs, and 25 to 45 percent shrubs.

Typically the sparse vegetation of most black sagebrush and low sagebrush communities precludes the occurrence of fire except in exceptional years. Black sagebrush stands, where they form a major part of the community, are a valuable wildlife winter forage species and should not be burned on a large scale basis.

The grasses associated with sagebrush communities are generally fire resistant. Bluebunch wheatgrass is a coarse-leafed plant without much fuel buildup around the base, so there are no prolonged high temperatures and most basal buds survive. Tiller production usually increases and biomass increases. Regrowth after a burn shows increased mineral content and lower fiber concentrations than unburned foliage.

Normally Indian ricegrass is only slightly damaged by fire. The stemmy habit and low culm density are characteristics which reduce charring of crowns below soil, thereby protecting growing basal buds. In Nevada, summer wildland fires studies have shown reduced basal area of Indian ricegrass, but little mortality was observed. Indian ricegrass easily re-seeds from adjacent non-burn plants.

Bottlebrush squirreltail is one of the most fire-resistant bunchgrasses. The coarse leaves and low density of dead plant material reduces damage by fire. Bottlebrush squirreltail increases in abundance after a fire. Shoot biomass, density, and the number of reproductive shoots may increase dramatically during the first post fire year.

Basin wildrye is generally considered to be quite resistant to fire mortality. The coarse stems and leaves of Basin wildrye protect basal buds located at or just below the surface. Basin wildrye has shown increased foliage production and higher densities after prescribed fire in the Ely District.

Bluegrass species are normally unharmed by fire. Bluegrass produces little litter, and its small size and sparse litter reduces the amount of heat transferred to the basal buds in the soil. Bluegrasses tend to mature and cure by spring and early summer reducing fire damage since the plant is dormant during most of the fire season.

Thurbers needlegrass, pine needlegrass and needle and thread grasses are the least fire resistant of the bunchgrasses. This is due to the dense fine fuels and culms around the bases of the plants. Large plants (basal area) are the most susceptible due to the greater buildup of fuels, and they typically reach higher crown temperatures. Fire effects depend on the season, phenology, as well as fire intensity and severity. Midsummer fires are the most damaging when carbohydrate reserves are low. For all the grasses it appears that post-growing season fires have the most beneficial effects.

The forbs found within sagebrush communities are generally unaffected by fire or are favored by fire. This is due in part to their growth forms and because most forbs are colonizing species.

Pinyon-Juniper Communities: These plant communities are characterized by pinyon pine (Pinus monophylla), Utah juniper (Juniperus osteosperma) and/or curlleaf mountain mahogany (Cercocarpus ledifolius). These communities occur on upper fan piedmont slopes to mountain ridge tops. Closed and open stands of pinyon-juniper cover approximately 2,500,000 acres within this plan. Slopes range from 15 to 75 percent, but slope gradients of 15 to 50 percent are most typical. Pinyon-Juniper communities are found at elevations from 5,500 to 9,000 feet. The pinyon-juniper communities may be roughly subdivided into four elevation and precipitation belts: 1) Juniper woodland sites occur on lower hills and rock pediment remnants on all aspects. Soils are very shallow to shallow over bedrock. Average annual precipitation is 10 to 12 inches. 2) Pinyon-juniper woodland sites with a black sagebrush or Wyoming big sagebrush understory occur mid-slope on all aspects. Soils can be shallow to moderately deep. Average annual precipitation is 10 to 14 inches. 3) Pinyon-juniper woodland sites with a mountain big sagebrush understory typically occur on mountain sideslopes on all aspects. Soils are shallow to moderately deep from mixed sources of volcanic origin. Average annual precipitation ranges from 12 to 14 inches. 4) Pinyon-curlleaf mountain mahogany woodland sites typically occur on mountain sideslopes of mostly northerly aspects at lower elevation (7,000 to 7,500 feet) and all aspects at higher elevations. Soil depth is moderately deep to deep over bedrock. Average annual precipitation is 14 to 22 inches.

The understory of pinyon-juniper communities primarily consist of big sagebrush species or black sagebrush. Grass species understory consists primarily of bluebunch wheatgrass, Thurber needlegrass, Indian ricegrass, Bottlebrush squirreltail, Basin wildrye, Sandberg bluegrass, Canby bluegrass, and muttongrass. Pinyon-juniper trees are prevalent enough to dominate these areas; however, antelope bitterbrush (Purshia tridentata), Utah serviceberry (Amelanchier utahensis) and common snowberry (Symphoricarpos albus) are important wildlife shrub components located within the understory. Potential vegetative composition is about 35 to 50 percent grasses, 10 to 20 percent forbs, and 35 to 50 percent shrubs.

Fires played an important role as a natural disturbance that strongly influenced the structure and composition of the climax vegetation on these woodland sites. Fires in pinyon-juniper communities regulate tree density and tree encroachment into adjacent plant communities. This maintains a balance between tree, shrub and herbaceous plant species, and promotes seral diversity. During the pre-settlement era, fire frequency in pinyon-juniper recurred at an interval of approximately every 20 years on north aspects and in canyon bottoms. Within these areas, fires typically burned at low to moderate intensity over large and continuous areas due to the presence of grass and shrubs to carry fire through the tree understory. On south and west aspects or dry, rocky sites, fires within pinyon-juniper woodland communities recurred at an interval of approximately every 50-100 years. Within these areas, fires were typically restricted to a small area, due to lack of grass and shrubs to carry fire through the understory or between stands of trees (Gruell et al. 1994). Stand replacing crown fire intervals most likely occurred between 200-300 years.

Ponderosa Pine Communities: These communities occupy approximately 2,500 acres and include small isolated areas considered to be remnants of large forests. The Ponderosa Pine community is an important community because it is uncommon and supports a unique diversity of flora and fauna. Fires burn with low intensity in a mosaic pattern in riparian ecosystems. On upland sites fire may burn as a continuous large surface fire. Fire plays an important role in sustaining species diversity within these communities; maintaining community structure within open stands of large ponderosa pines. During the pre-settlement era, fires recurred approximately every 20-50 years within the ponderosa pine communities.

Aspen Communities: Many areas in the mountains have small stands of quaking aspen and/or cottonwood (<u>Populus</u> spp.). It is estimated that approximately 10,000 acres of aspen are found within the plan area. The understory consists of forbs such as aster (<u>Aster</u> spp.), lupine (<u>Lupinus</u> spp.), and geranium (<u>Geranium</u> spp.), but is often dominated by common snowberry. Common grasses which may be present are Mountain brome (<u>Bromus</u> <u>carinatus</u>), Slender wheatgrass (<u>Agropyron</u> <u>trachycaulum</u>), Nevada Bluegrass, Bluebunch wheatgrass and Basin wildrye.

Aspen is usually killed by fire, but regenerates by root suckers. In the intermountain west, aspen stands mature and start declining after 80 to 100 years and become susceptible to insects and disease. Some stands may be lost to conifer encroachment, invading and shading out the aspen. In sagebrush areas, the stands may break up and convert to shrub dominated vegetation (Miller 1998). Aspen is a fire-dependent species, requiring fire to regenerate the stand and eliminate encroaching vegetation. Aspen is highly competitive on burned sites and may dominate after a fire even though there may be few aspen visible on the site. Given adequate rest, the recovery is good and the potential exists for increasing the total acreage of aspen within the plan area.

The primary grasses in the aspen community are moderately fire-resistant. Regeneration occurs through rhizomes, basal buds and/or an off-site seed source after a fire.

The forbs within this community are all moderately fire-resistant. Regeneration occurs through sprouting of underground rhizomes, basal buds and/or off-site seed source. Most forbs would survive in low to moderate intensity fires.

Mixed Conifer Communities: The mixed conifer communities occupy approximately 30,000 acres of the plan area. Tree species include limber pine (<u>Pinus</u> <u>flexilis</u>), white fir (<u>Abies</u> <u>concolor</u>), subalpine fir (<u>Abies</u> <u>lasiocarpa</u>), Englemann spruce (<u>Picea</u> <u>englemannii</u>), and at the highest elevations, bristlecone pine (<u>Pinus</u> <u>longaeva</u>). All age classes of the various conifer species are represented, although most are in the mature age class (100 to 300 years old). Mixed conifer communities can be found growing between 5,000 to over 12,000 feet, where precipitation is the greatest. However, they may extend down mountains to lower elevations in drainages or north slopes where there is moisture. A stand replacement fire occurring here may totally change the vegetative community, losing a potentially valuable resource.

Limber pine is susceptible to fire when it is young. The older trees have bark up to 2 inches thick, which acts as insulation and protects the trees from stem scorch. The terminal buds are somewhat protected from heat associated with crown scorch by tight needle clusters. The vulnerability of limber pine to fire is reduced by the open structure of the stand and sparse understory. The fuel loadings are generally light, leading to low intensity understory fires. Studies in Montana show a fire frequency of from 50 to 200 years. It is suggested that limber pine growing in open stands may be maintained by periodic surface fires which reduce the undergrowth.

White fir is a shade-tolerant species which thrives without fire. It rapidly invades limber pine and quaking aspen sites in the absence of fire. Sapling and pole-sized trees are very fire-sensitive because of their thin bark and low hanging branches, which easily ignite from surface fires. They achieve more fire resistance as the bark thickens. Small patches of mature white fir often survive fire and provide a seed source to re-colonize the site. The fire frequency in the Sierra Nevada Mountains was from 6 to 20 years under similar environmental conditions. This fire frequency kept the fire intensity low as there was little fuel build-up. This regime kept the forests dominated by open pine and Douglas fir, or quaking aspen stands. Today's heavy fuel accumulations and thick stands greatly increase the chances for high intensity stand replacement fires.

Englemann spruce is very sensitive to fire and is generally killed by even a low intensity fire. Post-fire establishment of seedlings is through seed dispersal from remaining mature trees. Pockets of Englemann spruce stands which escape burning are generally in moist sites where fire spread is limited. In subalpine sites, the spruce are less susceptible to fire due to the discontinuous fuels, moist environment, and the broken and rocky terrain. Englemann spruce has a fire frequency of approximately 150 years or more. Many of the Englemann spruce stands are the same age, suggesting that they developed after a fire. In the Cherry Creek Mountains in northeast Nevada, the Elko District observed Englemann spruce trees to have healed fire scars on healthy mature trees from low intensity surface fires. This suggests that low intensity, surface fires have occurred in this forest type as well as the usual stand replacement fires.

Subalpine fir is very sensitive to fire and generally has a high mortality from even low intensity fires. Subalpine fir stands are moist, with the lower, warmer sites experiencing a shorter fire return interval with a lower intensity. Areas with fire return frequencies of 20 years or less keep the areas dominated by seral conifers. Sites at higher and cooler elevations are subject to stand replacement fires occurring from 90 to 350 years.

Bristlecone pine stands generally occur in habitats where fuels to carry fire are basically non-existent. Fires with enough intensity to result in crown fires rarely occur in the grass-dominated understory. Surface fires in these areas are low intensity, slow burning and very infrequent.

Inland Douglas fir (Pseudotsuga menziesii var. glauca) may have been a dominant or co-dominant species in the mixed conifer community types. Douglas fir has existed in this area and still may be found in an occasional isolated area. The absence of Douglas fir may be due to a combination of early settlement timber harvest and successional changes to more shade-tolerant species. Douglas fir is among the most fire-tolerant tree species in the Great Basin, with larger trees having thick bark which serves as insulation. Low intensity, surface fires tend to reduce fuel levels and keep Douglas fir stands open. On sites where Douglas fir is a seral species (i.e. subalpine sites and/or north facing slopes) seedling establishment tends to improve after a fire. Large, high intensity fires tend to reduce seedling establishment and favor Englemann spruce and subalpine fir.

Curlleaf Mountain Mahogany Communities: These communities are associated with rock outcrops on sideslopes/summits, and gently rolling hills with moderately deep soils having high volumes of rock fragments throughout the soil profile. Curlleaf mountain mahogany is usually killed by fire. Seedlings do establish after fire, primarily by off-site seed and sometimes by resprouting. Studies in western and central Nevada on the Shoshone Range indicate that fire was infrequent in old growth stands, likely due to the lack of surface fuels and also from growing on extremely rocky (fire-proof) sites. The pre-settlement fire regime of curlleaf mountain mahogany communities most likely varied with community type and structure. Studies of mean fire interval of curlleaf mountain mahogany stands along the Salmon River in Idaho ranged from 13 to 22 years until the early 1900's, but lengthened considerably thereafter.

Northern Mountain Brush Communities: These communities occur on upland terraces and in mountain valleys and slopes. These communities occur throughout the Ely District, and are often associated with mountain big sagebrush. Slopes range from 4 to 50 percent, with the majority being 30 percent. Elevation ranges from 6,000 to 9,000 feet. The primary species present in these communities are serviceberry (Almelanchier utahensis), antelope bitterbrush, and snowberry (Symphoricarpos spp.).

Serviceberry can be damaged by wildland fire, but easily re-sprouts after a wildland fire. It also has the ability to remain in a suppressed state in a closed stand of conifers for a long time, and canopy removal by fire would stimulate sprouting.

Antelope bitterbrush is often killed by high-intensity fires. It regenerates either by sprouting after a fire, or from on-site rodent caches and off-site seed sources. The upright form found in this part of the Great Basin is less likely to sprout than low lying forms found in other areas. Spring fires are less damaging to antelope bitterbrush than summer or fall fires. Even though antelope bitterbrush is often killed by fire, it occurs in communities with a high fire frequency. Fire may be necessary to maintain populations of antelope bitterbrush by providing bare mineral soil and decreasing vegetative competition. Antelope bitterbrush has been monitored in the Diamond Mountains area of the Ely District since 1986. Up to 21 percent of live re-sprouts have been observed with numerous young seedlings and mature plants becoming established (Perkins 1999).

Snowberry is moderately resistant to fire and re-sprouting has been documented in Nevada. Studies within pinyon-juniper woodlands show a greater occurrence of snowberry than on adjacent mature woodlands.

The grasses associated with the northern brush communities are characterized by bluebunch wheatgrass, Thurbers needlegrass, western needlegrass (Stipa occidentalis), Indian ricegrass, muttongrass, and Canby bluegrass, with mountain big sagebrush. Potential vegetative composition is approximately 30 to 45 percent grasses, 10 percent forbs, and 45 to 60 percent shrubs.

Southern Mountain Brush Communities: These communities occur on summits and mountain slopes. Southern mountain brush communities occur throughout the southern portion of the Ely District, often in association with Pinyon-juniper communities. Slopes range from 20 to 70 percent, but slope gradients of 30 to 50 percent are most typical. Elevations range from 5,500 to 7,000 feet.

Desert bitterbrush (Purshia glandulosa) is fairly resistant to the most severe fire intensity. Desert bitterbrush sprouts frequently and abundantly after fire; it even sprouts after it is burned under dry conditions. Desert bitterbrush regenerates after fire either by re-sprouting from root crowns and adventitious roots just below the surface, or by off-site rodent seed caches. Desert bitterbrush freely interbreeds with antelope bitterbrush and the induced genetic variation likely affects resprouting in both species.

Gambel oak (Quercus gambelii) sprouts vigorously from stembases or from underground lingotubers and rhizomes following fire. Both rhizomes and lingotubers are protected from the fire by overlying soil; rhizomes are generally buried at depths of 4 to 20 inches and are well adapted to survive most fires. Fire promotes root sprouting and formation of buds on rhizomes. Gambel oak can readily reoccupy a site through seed protected in buried rodent seed caches. Very large, treelike Gambel oak is usually found on optimal sites, which are less likely to sprout after fire than the small shrublike growth form.

Turbinella oak (Quercus turbinella) is well adapted to survive fire. In response to fire or other types of disturbance, Turbinella oak resprouts vigorously from the root crown located below the soil surface. Although sprouting is apparently the most common form of regeneration after fire, growth from seed may also occur.

The important grass species in the southern brush communities are characterized by Desert needlegrass (Stipa speciosa), Richardson needlegrass (Stipa richardsonii), blue grama (Bouteloua gracilis), purple threeawn (Aristida purpura), Indian ricegrass, bottlebrush squirreltail, sandberg bluegrass and muttongrass. Potential vegetative composition is approximately 20-25 percent grasses, 10 percent forbs, and 65 to 70 percent shrubs.

Note: Much of the information presented in this appendix was obtained from the Fire Effects Information System [Online] (1996, September). Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research station (producer). Available: www.fs.fed.us/database/feis/ [1998, March 12].

APPENDIX C

Special Status Species

Federally Designated Threatened and Endangered Species and State-Protected Species

Scientific Name	Common Name	Status*
Empidonax traillii extimus	southwestern willow flycatcher	FE
Falco peregrinus	peregrine falcon	FT, SL
Haliaeetus leucocephalus	bald eagle	FT, SL
Crenichthys baileyi baileyi	White River springfish	FE, SL
Crenichthys baileyi grandis	Hiko White River springfish	FE
Crenichthys nevadae	Railroad Valley springfish	FT, SL
Empetrichthys latos	Pahrump poolfish; Pahrump killifish	FE, SL
Gila robusta jordani	Pahranagat roundtail chub	FE, SL
Lepidomeda albivallis	White River spinedace	FE, SL
Lepidomeda mollispinis pratensis	Big Spring spinedace	FT, SL
Gopherus agassizii	Desert tortoise	FT, SL
Spiranthes diluvialis	Ute lady's tresses	FT, SL

* FE - federally endangered; FT - federally threatened; and SL - listed by the State of Nevada in a category implying potential endangerment, extinction, extirpation, or local rarity.

Nevada BLM Sensitive Species

Scientific Name	Common Name
Mammals	
Euderma maculatum	spotted bat
Idionycteris phyllotis (=*Plecotus p.*)	Allen's big-eared bat
Macrotus californicus	California leaf-nosed bat
Microtus montanus fucosus	Paharanagat Valley montane vole
Myotis ciliolabrum	small-footed myotis
Myotis evotis	long-eared myotis
Myotis thysanodes	fringed myotis
Myotis velifer	cave myotis
Myotis volans	long-legged myotis
Myotis yumanensis	Yuma myotis
Plecotus townsendii townsendii	Pacific Townsend's big-eared bat

Birds

Accipiter gentilis	goshawk
Aquila chrysaetos	golden eagle
Buteo regalis	ferruginous hawk
Buteo swainsoni	Swainson's hawk
Centrocercus urophasianus	western sage grouse
Charadrius alexandrinus nivosus	western snowy plover
Chlidonias niger	black tern
Oreortyx pictus	mountain quail
Pandion haliaetus	osprey
Pelecanus erythrorhynchos	white pelican
Phainopepla nitens	phainopepla
Plegadis chihi	white-faced ibis
Speotyto cunicularia	burrowing owl

Fishes

Catostomus clarki intermedius	White River desert sucker
Catostomus clarki spp.	Meadow Valley Wash desert sucker
Crenichthys baileyi albivallis	Preston White River springfish
Crenichthys baileyi thermophilus	Moorman White River springfish
Gila bicolor newarkensis	Newark Valley tui chub
Gila bicolor ssp.	Big Smoky Valley tui chub
Gila bicolor ssp.	Fish Lake Valley tui chub
Gila bicolor ssp.	Railroad Valley tui chub
Oncorhyncus clarki utah	Bonneville cutthroat trout
Relictus solitarius	relict dace
Rhinichthys osculus velfer	Pahranagat speckled dace
Rhinichthys osculus ssp.	Meadow Valley Wash speckled dace

Reptiles

Bufo microscaphus microscaphus	Arizona toad
Heloderma suspectum	Gila monster
Sauromalus obesus	chuckwalla

Snails

Fluminicola merriami	Pahranagat pebblesnail
Oreohelix nevadensis	Schell Creek mountainsnail
Tryonia clathrata	grated tryonia

True Bugs

Pelocoris shoshone shoshone	Pahranagat naucorid bug

Butterflies

Cercyonis pegala ssp.	White River wood nymph
Euphilotes battoides ssp.	Baking Powder Flat blue
Phyciodes pascoensis ssp.	Steptoe Valley crescentspot

Plants

Asclepias eastwoodiana	Eastwood milkweed
Astragalus eurylobus	Needle Mountains milkvetch; Peck Station milkvetch
Astragalus funereus	black woollypod; funeral milkvetch; black milkvetch
Astragalus oophorus var. *lonchocalyx*	long-calyx eggvetch; pink eggvetch
Astragalus uncialis	Currant milkvetch
Castilleja salsuginosa	Monte Neva paintbrush
Cryptantha welshii	White River catseye; Welsh catseye
Erigeron ovinus	sheep fleabane
Frasera gypsicola	Sunnyside green gentian; Sunnyside elkweed
Jamesia tetrapetala	waxflower
Penstemon concinnus	Tunnel Springs beardtongue
Phacelia parishii	Parish phacelia; playa phacelia
Sclerocactus blainei	Blaine pincushion; Blaine fishhook cactus
Sclerocactus schlesseri	Schlesser pincushion; Schlesser fishhook cactus
Silene nachlingerae	Jan's catchfly; Nachlinger catchfly
Sphaeralcea caespitosa	Jones globemallow

APPENDIX D

Fire Effects on Cultural Resources

Prehistoric Occupation. Prehistoric occupation spans the last 10,000 years. The first inhabitants of the region arrived at the end of the last glacial period. They were hunter-gatherers who had a mobile lifestyle. Initially populations were very low. Resource exploitation was centered in the lowlands, particularly around the marshes which developed as pluvial lakes dried up. Camp sites were usually small, and used for only a short time. As the population increased, long-term camp sites were established. Some sites were used repeatedly because of their ideal locations. As time passed, the uplands were utilized as fully as the lowlands. The aboriginal population appears to have peaked between 700 and 1300 years ago. The archaeological evidence of prehistoric use ranges from a spot where someone lost a single artifact to areas where there are large collections of artifacts and archaeological features. Among the various types of sites are isolated artifacts, pot drops, butchering locations, toolstone quarries, rock art sites, camp sites, villages, seed processing locations, game observation posts, tool manufacturing locations, hunting blinds, and wild game traps.

Historic Occupation. European settlers first entered the area in the late 18th Century. They were seeking furs for trading, mineral resources, travel routes to the west coast, refuge from persecution, and land suitable for homesteading. The first historic settlements, which were Mormon farming communities, became established in the mid 19th Century. They were followed shortly by mining boom towns, military camps, stage stations, homesteads and ranches. Historic resources includes individual cans and bottles, trash dumps, log and stone residences, fences, horse traps, roads, utility poles, railroad grades, bridges, mining claim markers, prospects, mine adits, headframes, waste dumps, stone quarries, charcoal making platforms, and historic landscapes.

Natural Fire Regime. The fire history in the Great Basin, and the effects it has had on cultural resources, is a vital component of the cultural resource history. There is evidence to support the existence of repeated wildland fires in eastern Nevada. It is not uncommon to find thin lines of charcoal exposed in arroyo cuts, marking episodes of prehistoric burning. Often more than one episode is visible in the exposure. In the pinyon-juniper woodlands, ancient burned-out stumps can sometimes be found among mature stands of trees. Thermal damage to artifacts in archaeological sites may be a direct line of evidence for burning of cultural properties. Artifacts exhibiting crazing or pot lid scars, although not abundant, are routinely encountered in archaeological sites. Intentional heat treatment may account for some of this damage, but wildland fire is probably the more common cause. Because fire was a major component of the ecosystem, few cultural resources over 150 years of age would have escaped burning. Most would have breen burned multiple times.

Direct Effects. Fire directly affects archeological materials on the surface by flame and heat. Under the surface, heat tapers off rapidly and is unmeasurable below 10 cm of mineral soil. The fuel type, fuel load , fuel moisture, amount of surface litter, topography, and weather conditions determine the intensity and duration of a fire. Surface temperatures encountered during typical rangeland fires are between 100°C and 388°C. If organic materials are not located on or near the surface, and if the fire temperature is below 350°C at the level of the artifact, the effect on cultural resources would be negligible (Knight 1994). High temperature fires have the potential to damage most classes of archaeological artifacts and features. The longer high heat is in contact with the artifacts and features, the greater the damage.

Fire can severely damage, and even destroy artifacts made of organic materials such as wood, shell, bone, antler, horn, plant fiber, hide, and cloth if the remains are exposed on the surface or not buried too deep (Traylor et al. 1990).

The most common prehistoric artifacts are flaked stone tools. They are not highly susceptible to wildfire, but can be altered, damaged, or even destroyed by fire. Impacts include smudging, cracking, breaking, spalling, shattering and oxidizing. The intensity and duration of the heat is the most important factor. The minimum temperature needed to cause changes to flaked stone artifacts depends on the chemical and physical characteristics of the rock. Laboratory experiments indicate that some crystalline structure of silica-rich stone can be altered, or the stone broken, at temperatures above 370°C (Hanes 1994). Other rock types require temperatures in excess of 500°C. Post-fire field observations in several areas, confirm damage to chert artifacts from high-intensity fires. Flaked stone artifacts which have been damaged by fire have been found in the Ely District; however, these artifacts comprise only a small percentage of the total number of artifacts observed. Currently it is impossible to separate out artifacts which were affected by fire during manufacture and use, and artifacts which have been altered by wildfire.

Pottery may be seriously affected by fire by affecting its chemical composition, changing its color, and altering or removing any decorative paints. Substantial changes occur at temperatures of 495°C and above (Hanes 1994).

Large ground stone artifacts (i.e., manos and metates) and rocks appear to be relatively unaffected by all but the most intense fires. Smudging occurs, but breakage is uncommon. One concern is that stones altered by wildfire would be indistinguishable from rocks used for cooking and heating by prehistoric people (Conner et al. 1989). Naturally heat-spalled rocks are not usually found on flat ground, but instead are found on slopes where the intensity of the heat at the ground surface is greatly increased due to the flame edge moving up a steep angle.

Rock art sites are susceptible to damage by fire and can be completely destroyed. Painted elements (pictographs) can be soot blackened, scorched or completely burned away, while pecked elements (petroglyphs) on friable stone such as sandstone and limestone can exfoliate (Conner et al. 1989, Morris 1992). Rock art is often located on vertical sides of boulders or cliff faces where the heat is greater. These surfaces can be superheated particularly when vegetation has built up next to the boulder or cliff face. These effects have been observed in the Ely District at the Reed Cabin Summit Pictographs burned in 1993, and at the Condor Canyon Petroglyphs burned in 1999.

Standing buildings and structures, both prehistoric and historic, can be destroyed by fire. Obviously wooden buildings, structures, and components can be completely consumed by fire.

Masonry buildings and structures can also be damaged. Cracking, spalling, and exfoliating of masonry components have been observed at the historic Panaca Summit kilns which were burned over in 1994. Like at rock art sites, vegetation tends to build-up around these unused standing structures, causing the same superheating and higher flame lengths.

Wood rat middens, which are found in cliffs and caves, are used for paleo-environmental studies. They include accumulated plant remains and other debris cemented by wood rat urine. These middens can survive for thousands of years, and are used to reconstruct past environments. Because wood rat middens are comprised of organic material, they can be completely destroyed by fire.

Fire can also affect the archaeologist's ability to date prehistoric sites. A radioactive carbon isotope exists in all living things. Radiocarbon dating measures the rate of decay of this carbon isotope after an organism dies. Fire contaminates radiocarbon samples with recent ash and charcoal, physically and chemically altering datable material, and destroying the ability to date the site. Thermoluminescence dating of pottery and rock artifacts requires measuring the minute amounts of light accumulated in the matrix of rocks and pottery due to the decay of radioactive material since the material was last heated. Exposure to high heat, such as during a fire, reduces or eliminates the light. This results in dates which are inaccurate. Obsidian hydration is a dating technique that measures the amount of moisture absorbed by obsidian artifacts. The moisture accumulates at a steady rate and forms a microscopic band on the surface of the artifact. By measuring the thickness of the band, the age of the artifact can be estimated. Exposure to high heat can alter or destroy this hydration band. Archeomagnetic dating measures the orientation of electrons in clay of prehistoric hearths. The electrons in unheated clay align with the north pole, but are frozen in place by heating. Dates are obtained by comparing the orientation data with tables showing the location of the north pole as it has shifted over time. If hearths are exposed to temperatures exceeding 524°C the electrons will realign with the current magnetic field erasing the record of its prehistoric use (Hanes 1994).

Indirect Effects. Fires remove vegetation, exposing the soil to erosion. Erosion, either by wind or water, can damage cultural sites. Artifacts may be moved from their original locations, or become mixed with artifacts from other strata. Perishable materials (i.e., bone, charcoal, pollen, shell, etc.) may become exposed and subjected to the elements, and eventually be destroyed. Artifacts and features which were previously obscured, now become exposed, and may easily be collected.

Fire-sensitivity. Because fire affects cultural materials differently, artifacts and sites can be separated into two categories based on fire-sensitivity. Rock art sites, buildings, and structures, plus artifacts made of organic materials exposed to the surface are considered fire-sensitive because they can be totally destroyed by fire. Cultural materials like chipped stone, ground stone, glass, and cans are considered non fire-sensitive. Although these artifacts can be damaged by fire, little information is lost when they are burned over by the fire. All buried artifacts and portions of sites below the ground are also considered non fire-sensitive because fire does not directly affect them.

APPENDIX E

Standard Operating Procedures for Managed Natural Fires and/or Prescribed Fire

During the planning phase of a prescribed fire, residents close to the project site will be contacted which will allow them opportunity to be away from the area during the project implementation.

Smoke emission modeling will be used to project negative effects.

Appropriate actions will be taken to reduce smoke emissions if air quality parameters are exceeded.

Warning signs may be placed on main roads when there will be reduced visibility because of smoke.

An archeological reconnaissance will be conducted within the expected burn area to locate any fire-sensitive resources.

Fire-sensitive archeological resources and historic properties will be protected using appropriate fire suppression measures.

A cultural resource inventory may be completed for all bladed fire lines, including previously un-bladed two-track roads, areas subject to repeated vehicle use, staging areas, and any other locations where there will be ground disturbance.

Areas where there are concentrated active mine claims, active mining notices, plans, and mineral material sales on record with the BLM will be identified and avoided.

Natural fuel breaks and existing roads will be used whenever possible to minimize ground disturbance.

Dozer lines will not be constructed within 150 feet of a riparian/wetland area.

Fire lines will avoid significant cultural properties.

Dozer lines would be utilized only when absolutely necessary.

"Light-Hand on the Land" fire suppression methods will be used in wilderness study areas.

All uses of earth moving equipment in wilderness study areas require authorization.

Use of fire retardant chemicals or wetting agents in or near riparian/wetland areas will be avoided.

All waste, debris, and foreign matter will be removed and disposed of in a legal landfill.

The burned area will be rested from livestock grazing for a minimum of two growing seasons, or until resource objectives have been met.

APPENDIX F

APPENDIX G

PRESCRIBED FIRE PLAN

(H-9214-1 - PRESCRIBED FIRE MANAGEMENT)

____

PROJECT NAME **FIELD OFFICE**

Prepared By:____ Date:_________

Technical Review By:__________________________________ Date:_________

Reviewed: By:_______________________________________ Date:_________

Reviewed By:____ Date:_________

The approved Prescribed Fire Plan constitutes the authority to burn. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved Prescribed Fire Plan will be fully supported. Personnel will be held accountable for actions taken which are not in compliance with elements of the approved plan regarding execution in a safe and cost-effective manner. The complexity of this project is:

HIGH _____ MODERATE ______ LOW _____

Estimated Cost Per Acre _____________

Benefitting Activity(s) _____________

Approved By:_____________________________________ Date:_______

MANAGEMENT SUMMARY AND RISK ASSESSMENT

BURN AREA DESCRIPTION

Legal Description: **Lat./Long.**

Size:

County:

Elevation: Top: Bottom: Aspect: Drainage:

Environmental Assessment No.: **RIPS No.**

DESCRIPTION OF FUELS ON SITE AND ADJACENT:

FUELS DESCRIPTION: NATURAL: ACTIVITY:

Photo series and Code(s): GTR: Code:

Fuel Model(s): NFDRS FBPS

SIZE CLASS TONS ACRE: Total Dead: Duff Depth:

0-."1 **Shrubs:** **Surface Fuel Depth:**

1"-3 **Herbaceous:**

3"-9" **Total Fuel Loading (Live & Dead):**

9"-20"

20" + **Continuity:**

General description of the fuels adjacent to the project area:

PROJECT OBJECTIVES

RESOURCE OBJECTIVES	PRESCRIBED FIRE OBJECTIVES (Specific)

TOLERABLE DEVIATION OF OBJECTIVES:

-

WEATHER AND FUEL PARAMETERS

	ACCEPTABLE PRESCRIPTION RANGE			
	(Low)	(High)	(Desired)	
Temperature				OUTSIDE AREA AT CRITICAL HOLDING POINT MINIMUM ACCEPTABLE MOISTURE
Relative Humidity				
Wild Speed (Mid Frame)				
Slope				
Wind Direction				
1 hr. Fuel Moisture				
10 hr. Fuel Moisture				
1000 hr. Fuel Moisture				
Live Fuel Moisture				
Woody Fuel Moisture				
Duff Moisture				
Soil Moisture				

	ACCEPTABLE FIRE BEHAVIOR RANGE			
	(Low)	(High)	(Desired)	
				OUTSIDE AREA AT CRITICAL HOLDING POINT
Fuel Model(s)				Model
Rate of Spread				Ch./hr.
Heat Per Unit Area				BTU/ft.
Fire line Intensity				BTU/ft/sec.
Flame Length				Feet
Probability of Ignition				%
Reaction Intensity				BTU/ft./min.
Scorch Height				Feet
Spotting Dist.				Miles

SMOKE MANAGEMENT

Smoke Management No.:
Distance and Direction From Smoke Sensitive Area(s):

Available Fuel Reported For Smoke Management:

Necessary Transport Wind Direction:
Visibility Hazard(s) (i.e., roads, airports, etc.:)

Actions to Reduce Visibility Hazard(s):

Can Residual Smoke Be a Problem?

Special Constraint(s)/Consideration(s):

SCHEDULING & NOTIFICATIONS

Ignition Scheduling:

Season: **Approximate Date:** **Time of Day:**
Limitation on Days of Week for Burning: **Type of Burn:**
Length of Ignition Phase: **Length of Burnout Phase:**

Public Information: (What, When, By Whom):

Pre-burn & Burn Contacts: (When, By Whom):

IGNITION & HOLDING

Firing Plan:

Potential Holding Problems:

Location of Holding Forces and Instructions:

Water Sources:

Counter Measures for Slopovers:

Public Safety Provisions:

Other:

WORKFORCE & EQUIPMENT NEEDS FOR IGNITION & HOLDING

Prescribed Fire Burn Boss: **Resource Advisor:**
Ignition Specialist: **Holding Specialist:**

		AMOUNT SUPPLIED BY	
PERSONNEL	**TOTAL AMOUNT**	**BLM**	**OTHER**
EQUIPMENT **Ignition Equipment**			
Engines			
Water Tenders/Other			
Fittings/Hose/Etc.			
Pumps and Accessories			
Other (Radios, Belt Wx Kits, etc.)			

PROPOSED COST

PROPOSED TOTAL COST:

These costs could all be in the 2823 subactivity; or could be spread across several subactivities; estimate the cost for each area.

Site Preparation:

Ignition + Holding:

Mop & Patrol:

Supplies:

These costs could be in one or more subactivities; estimate the cost and show the subactivity for each area.

Planning:
- **E.A.**
- **Clearances**
- **Plan Preparation**

Other:

ESCAPEMENT CONTINGENCY PLAN

NOTE: THIS IS ONLY AN EXAMPLE. A SITE SPECIFIC CONTINGENCY PLAN NEEDS TO BE DEVELOPED FOR EACH PRESCRIBED FIRE PROJECT.

1. Should an escape occur, the Prescribed Fire Burn Boss (or other designated person) will act as IC until relieved. The IC will organize all on site resources for an appropriate management response. If the fire can be contained with on site personnel, this is not a escaped fire.

2. The IC will notify__________________ of the situation and order the needed resources. Field Office personnel will notify adjacent landowners as needed.

3. The FMO and/or IC and the environmental specialist will develop an WFSA. This document will determine what the suppression effort will be.

4. Upon an escape, all key personnel will initiate a unit log to document all actions taken. After the incident is contained, the Prescribed Fire Burn Boss will submit a report documenting weather, resources on site, ignition sequence, suppression actions, and other pertinent data.

PRESCRIBED FIRE CREW BRIEFING CHECKLIST

UNIT NAME/NO.:____

CHAIN OF COMMAND:

OBJECTIVES:

COMMUNICATIONS:

FIRING/HOLDING ASSIGNMENTS:

CONTINGENCY:

WEATHER FORECAST:

SAFETY:

JHA
Known Hazards
Public Safety
Other

PUBLIC SAFETY:

OTHER CONSIDERATIONS AND NOTES ON THE BRIEFING:

Signed:________________

Date:_________________

<u>GO/NO-GO CHECKLIST</u>

<u>(A "NO" RESPONSE TO ANY ITEM MEANS STOP!)</u>

1. ARE <u>ALL</u> FIRE PRESCRIPTION SPECIFICATIONS MET?

2. ARE <u>ALL</u> SMOKE MANAGEMENT PRESCRIPTION SPECIFICATIONS MET, AND/OR HAS SMOKE MANAGEMENT CLEARANCE BEEN GIVEN FOR THE PROJECT?

3. IS THE AREA FIRE WEATHER FORECAST FAVORABLE?

4. ARE <u>ALL</u> REQUIRED PERSONNEL IN THE PRESCRIBED FIRE PLAN ON-SITE?

5. IS <u>ALL</u> REQUIRED EQUIPMENT IN THE PRESCRIBED FIRE PLAN IN PLACE AND FUNCTIONAL?

6. HAVE <u>ALL</u> PERSONNEL BEEN BRIEFED ON THE PROJECT OBJECTIVES AND THEIR ASSIGNMENTS?

7. HAVE <u>ALL</u> PERSONNEL BEEN BRIEFED ON THE SAFETY HAZARDS, ESCAPE ROUTES AND SAFETY ZONES.

8. HAVE <u>ALL</u> THE REQUIRED NOTIFICATIONS BEEN MADE?

9. ARE THE “CONTINGENCY RESOURCES” ADEQUATE FOR CONTAINMENT OF ESCAPES UNDER THE EXPECTED CONDITIONS?

10. IN YOUR OPINION, CAN THE BURN BE CARRIED OUT ACCORDING TO PLAN AND WILL IT MEET THE PLANNED OBJECTIVES?

IF ALL QUESTIONS WERE ANSWERED “YES” PROCEED WITH A TEST FIRE. DOCUMENT THE CONDITIONS, LOCATION AND RESULTS.

Signed: ___________________________
Prescribed Fire Burn Boss
Date: ___________________________

MEDICAL PLAN

INCIDENT MEDICAL AID STATIONS

MEDICAL	LOCATION	PARAMEDICS	
		YES	NO
Trauma kit and burn kit on site			

* Identify any on site EMT's, and First Responders.

TRANSPORTATION

A. Ambulance services

NAME	TELEPHONE	ADDRESS	PARAMEDICS	
			YES	NO

B. Incident Ambulance

NAME	LOCATION	PARAMEDICS	
		NO	YES
Helispot			

HOSPITALS

NAME	ADDRESS	TRAVEL TIME		PHONE	HELIPAD		BURN CENTER	
		AIR	GRND		YES	NO	YES	NO

* Identify the Latitude and Longitude for hospitals with helipads. Also list hospital radio frequencies.

MEDICAL EMERGENCY PROCEDURES

Notify Prescribed Fire Burn Boss of serious accidents or injuries. The Prescribed Fire Burn Boss will initiate on site response and coordinate additional needs through ___________. The first option is to transport to ________________ if using an ambulance for transport, send someone to meet the ambulance at a known location. IE. Highway Junction or known landmark.

INCIDENT RADIO COMMUNICATIONS PLAN

<table>
<tr><th>SYSTEM/CACHE</th><th>CHANNEL</th><th>FUNCTION</th><th>FREQUENCY</th><th>ASSIGNMENT</th><th>REMARKS</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td rowspan="4">H = Hand held
M = Mobile</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td></td><td colspan="5"></td></tr>
</table>

* If aerial ignition is used consider assigning a specific radio frequency for use between the aircraft and Prescribed Fire Burn Boss and/or Ignition Specialist.

DAILY MOP UP SHIFT PLAN

Burn Date: **Shift Plan Date:**

PREDICTED WEATHER NEXT 24 HOURS		
	MINIMUM	**MAXIMUM**
Temperature		
Relative Humidity		
Wind Speed (20 ft.)		
Wind Direction		

Weather Trend Narrative:

Shift Plan Objective:

Special Considerations and Hazards:

Mop Up IC: **Patrol Coordinator:**

		AMOUNT SUPPLIED BY:		
PERSONNEL	**TOTAL AMOUNT**	**BLM**	**PURCHASER**	**OTHER**
EQUIPMENT				
ENGINES				
HOSE				
PUMPS				
OTHER				
Add extra pages as needed				

PRESCRIBED FIRE REPORT

Burning Unit: **Date(s):**

Date of Burn(s) **Time of Burn(s):**

On site moisture conditions obtained by (sticks, oven, NFDRS, etc.):

Temp. **R.H.** **Wind Speed** **Direction:**

Fuels Present after Burning: **Estimated:** **Measured:**

ACHIEVEMENT OF PRESCRIBED FIRE OBJECTIVES

Short Term **Results**

Prescribed Fire Boss Comments (i.e..., fire behavior, personnel & equipment performance, etc.

____

Prescribed Fire Burn Boss

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